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Indian Standard

SHIPBUILDING — ROUND WINDOWS (SIDE SCUTTLES)

(First Revision)

भारतीय मानक

पोतनिर्माण–गोल खिड़कियाँ (पार्श्व तैलछिद्र)

(पहला पुनरीक्षण)

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July 1990 **Price Group 11**

Shipbuilding Sectional Committee, TED 17

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards on 19 December 1989, after the draft finalized by the Shipbuilding Sectional Committee had been approved by the Transport Engineering Division Council.

This standard was earlier issued in 24 parts, each part covering manufacturing details and dimensions of individual components, such as main frame, glassholder, deadlight, etc, for each type of round window (side scuttle) separately. It has now been decided to rationalize the dimensions, giving only the critical dimensions effecting the interchangeability round windows (side scuttles). The revised standard is being issued in five parts as follows:

Part 1 General requirements;
Part 2 Dimensions of Heavy (Type A) Round Windows;
Part 3 Dimensions of Medium (Type B) Round Windows;
Part 4 Dimensions of Light (Type C) Round Windows; and
Part 5 Manufacture and Installation on Boardships.

Further, round windows of nominal size 150 mm have been deleted and of nominal size 450 mm have been included in this revision.

The glossary of terms and positioning of round windows have been covered in separate Indian Standards.

The standard generally incorporates the requirements under the Merchant Shipping Act, 1958, and the Rules made thereunder; and in addition, general requirements and positioning of ships' round windows is subject to the approval by the Government of India under the said Act and the Rules.

In the preparation of this standard, assistance has been derived from BSMA 24 'Specification for ships' side scuttles', issued by British Standards Institution (BSI). Further, the current work of ISO/TC 8 'Shipbuilding and Marine Structures, in this field has also been taken into account.

Indian Standard
SHIPBUILDING — ROUND WINDOWS (SIDE SCUTTLES)

PART 1 GENERAL REQUIREMENTS

(First Revision)

1 SCOPE

Specifies the classification, dimensions for interchangeability and construction materials and testing of ships' round windows (side scuttles).

2 REFERENCES

IS No.	*Title*
291 : 1989	Naval brass rods and sections (for machining purposes) (*third revision*)
292 : 1983	Leaded brass ingots and castings (*second revision*)
318 : 1981	Leaded tin bronze ingots and castings (*second revision*)
617 : 1975	Aluminium and aluminium alloy ingots and castings for general engineering purposes (*second revision*)
1030 : 1982	Carbon steel castings for general engineering purposes (*third revision*)
1264 : 1989	Brass gravity die castings (ingots and castings) (*third revision*)
1570 (Part 5) : 1985	Schedules for wrought steels: Part 5 Stainless and heat resisting steels (*second revision*)
2062 : 1984	Weldable structural steel (*third revision*)
2107 : 1977	Whitheart malleable iron castings (*first revision*)
2108 : 1977	Blackheart malleable iron casting (*first revision*)
3039 : 1988	Structural steel for construction of hulls of ships (*second revision*)
6180 : 1989	Toughened safety glasses for ships' round windows (*first revision*)
8809 : 1978	Gaskets for ships' side scuttles and rectangular windows
11914 : 1986	Glossary of terms for ships' windows

3 TERMINOLOGY

For the purpose of this standard the following definitions, in addition to those given in IS 11914 : 1986, shall apply.

3.1 Normal Round Window (Side Scuttle)

A round ships' window having a toughened safety glass pane.

3.2 Fire-Resistant Round Window

A round ships' window having a fire-resistant glass pane, with deviations in its construction and has to meet special requirements.

3.3 Nominal Size of Ships' Round Window

This is the clear opening of glass and is also referred to as clear light size (dl).

3.4 Passenger Ship

A ship carrying more than 12 passengers other than the crew.

3.5 Cargo Ship

Any ship which carries cargo and is not a passenger ship.

3.6 Bulk-Head Deck

It is the uppermost deck up to which the transverse waterlight bulkheads are carried and is used with reference to passenger ships only.

3.7 Datum Deck

It is the free board deck in a cargo ship (non-passenger ship) and the bulkhead deck or free board deck, whichever is higher, in a passenger ship (*see* Fig. 1).

3.8 Free Board Deck

It is the uppermost complete deck exposed to weather and sea having permanent means of closing all openings in its weather portions and below which all openings in the sides of the ship are fitted with means of watertight closing. In flush deck ships and ships with detached superstructures it refers to the upper deck.

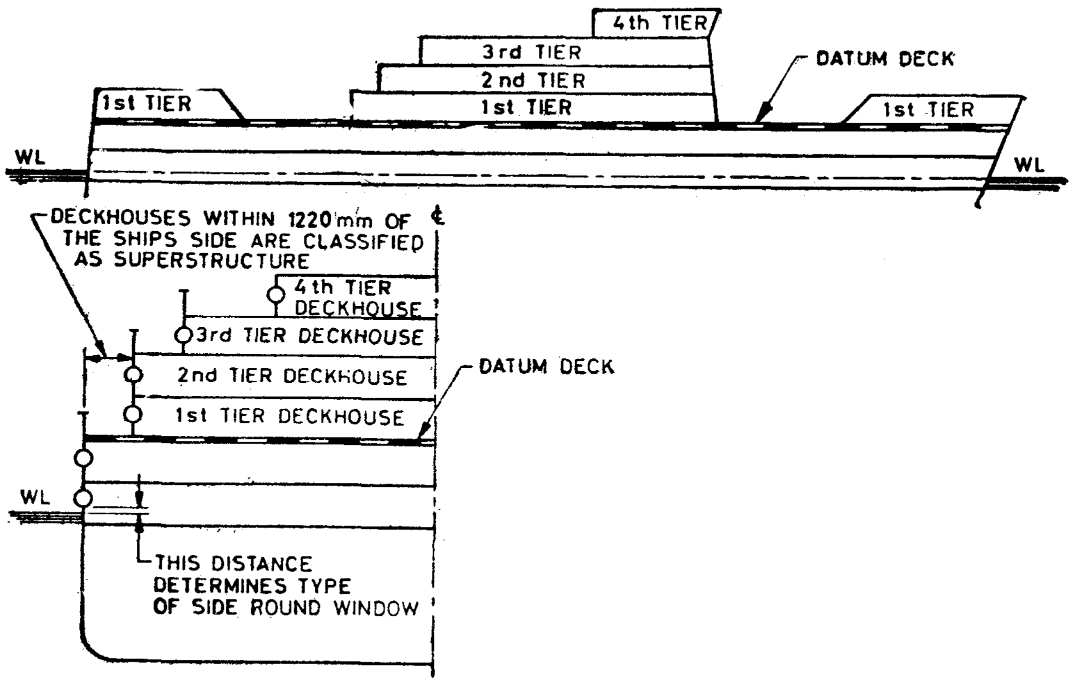


FIG. 1 DIAGRAM ILLUSTRATING TIERS AND DECK HOUSES

3.9 Superstructure

A decked structure on the freeboard deck which entitles the ship to reduction in freeboard. Deckhouses whose sides are within 1·22 m or 4 percent of the breadth of the ship, whichever is lower from the ships' side shall be treated as a superstructure without regard to allowance for freeboard.

3.10 Tiers

Spaces above the higher of the bulkhead deck or free board deck in passenger ship, or the free board deck in cargo ships (*see* Fig. 1).

3.11 Margin Line

Is an imaginary line drawn at 76 mm or more below the upper surface of the bulkhead deck at side.

4 TYPES

4.1 The round windows shall be of three types as follows:

Type A — Heavy type;

Type B — Medium type; and

Type C — Light type.

NOTE — The differentiation between types A, B and C is derived from the thickness of the toughened safety glass pane and the tensile strength and elongation of the material for the main components.

4.1.1 The round windows are further sub-divided as opening and non-opening types, left or right hand with or without deadlight.

5 NOMENCLATURE

5.1 The nomenclature of various parts of the round windows are shown in Fig. 2 and 3.

6 MATERIAL

6.1 The material used for construction of round windows shall comply with the requirements of Table 1 as regards chemical composition and mechanical properties. The mechanical testing of all materials shall be carried out in accordance with the mechanical test requirements of the appropriate Indian Standard given in Table 1.

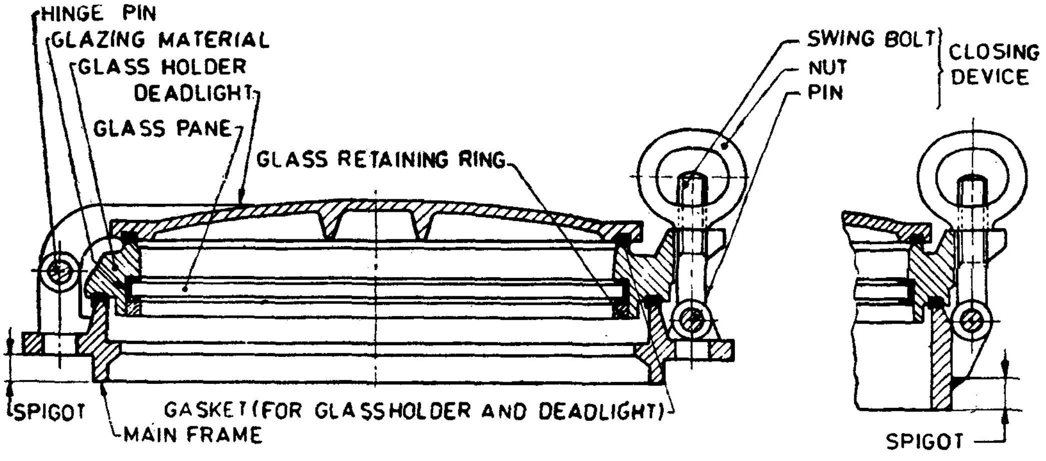
6.2 Glasses

The toughened safety glasses shall be in accordance with IS 6180 : 1989.

7 DESIGN AND CONSTRUCTION

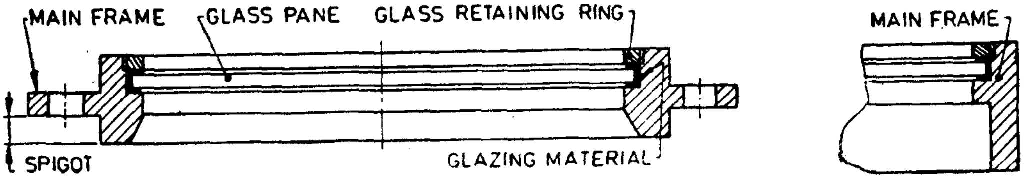
7.1 General

Round windows shall be manufactured to the



BOLTED WELDED

FIG. 2 NOMENCLATURE FOR OPENING ROUND WINDOWS WITH DEADLIGHT



BOLTED WELDED

FIG. 3 NOMENCLATURE FOR NON-OPENING ROUND WINDOWS WITH DEADLIGHT

dimensions given in Part 2, 3 and 4 and from materials specified in Table 2 (*see* also Table 1). The complete round windows, frames, glass holder and dead lights shall be of good quality of workmanship and finish, and shall be capable of meeting the test requirements for watertightness specified in **8** of this standard.

7.2 Construction

The mechanical properties of materials used in the manufacture of main frame, glass holders and dead light shall conform to those specified in Table 2.

7.2.1 *Frames*

Frame shall be made of brass, aluminium alloy, gunmetal, cast steel, malleable cast iron or in case of welded round windows, mild steel.

7.2.2 *Glass Holder*

Glass holder shall be made of brass, naval brass, aluminium alloy or gunmetal.

7.2.2.1 For non-opening welded round windows, extruded naval brass section shall be of 12 mm thickness × width varying from 32 to 41 mm depending upon thickness of glass to be used. The extruded section shall be bent into circular shape and welded at the ends.

7.2.3 *Glass Retaining Ring*

A glass retaining ring shall be made of brass, naval brass, aluminium or gunmetal, having an internal diameter equal to that of the clear light size of the round windows. The dimensions of glass retaining ring shall be as given in Table 3.

7.2.4 *Deadlights*

Deadlights shall be made of brass, naval, brass aluminium alloy, gunmetal, mild steel cast steel, malleable cast iron. Deadlights shall be ribbed except in the case of those manufactured from mild steel.

7.2.5 *Castings*

The castings shall be clean, sound and free from harmful defects. Defects likely to affect the suitability of the castings for the purpose for which they are designed, shall not be repaired unless permission has been obtained from the purchaser or his representative.

Where malleable cast iron is used for frames or deadlights the surface of the castings should not be removed for fitting to a greater extent than is necessary.

7.2.6 *Swing Bolts, Pins and Nuts*

The mechanical properties of the materials used in the manufacture of swing bolts, hinge pins and nuts shall be in accordance to that specified in Table 4.

7.2.6.1 *Swing bolts*

Swing bolts shall be made of wrought naval brass or stainless steel. For aluminium alloy round windows, the swing bolts and hinge pins shall be made of corrosion resistant steel or of alloy that is not likely to cause corrosion of the round windows or of bolts and pins, provided the mechanical strength of the alloy is equivalent to that specified in Table 3.

7.2.6.2 *Hinge pins and locking pins*

Hinge and locking pins shall be made of stainless steel conforming to IS 1570 (Part 5) : 1985 or Naval brass conforming to IS 291 : 1977.

7.2.6.3 *Nuts*

Nuts shall be made of cast brass, wrought brass, cast aluminium alloy or of corrosion resistant steel. The ends of the bolt shall be so finished as to prevent the nut becoming detached from the bolt.

8 GLAZING

8.1 General

When glazing, it is essential to position the glass in the glass holder or in the frame in case of non-opening round windows so that there is clearance all round. The glass should be bedded either on rubber or similar material with the dimensions given in Table 5.

8.2 Glazing Strips

The dimensions of sealing strip or gasket used for ensuring watertightness between the glass holder and main frame and also between deadlight and glass holder shall be manufactured from synthetic rubber, in accordance with IS 8809 : 1978.

9 TESTING

9.1 During Manufacture

9.1.1 *Frames and Deadlights*

On prototype design three frames and deadlights shall be tested to destruction by being bent when cold and before being machined. Each frame or deadlight shall be capable of being bent through an angle of 20° without showing signs of fracture. The bending may be performed by blows or by pressure.

9.1.2 *Swing Bolts and Hinge Pins*

No special tests are required other than those mentioned in the relevant Indian Standard.

9.1.3 *Additional Tests Before Rejection*

If the test samples fail to fulfil the requirements of 9.1.1 two further tests of the same kind shall be made. Should these repeat tests also fail, the batch they represent shall be rejected.

9.1.4 *Strength Test for Completed Round Window*

Prototype, completed round window without glass and with closed deadlight, shall be subjected to a punch test with the following test pressures:

Round Window Type	*Test Pressure* kPa
Heavy	240
Medium	120
Light	60

9.1.4.1 *Method of conducting the test*

The punch shall be placed on the side of the deadlight which will come in direct contact with sea. When necessary, a 10 mm thick plate of 100 mm dia may be placed between punch and the deadlight. The permanent deformation of the deadlight shall not exceed one percent of the nominal diameter of the round window. If this value is exceeded, the deadlight shall be rejected.

9.1.5 *Watertightness Test for Completed Round Window*

The round window shall be tested hydraulically, with glass and open deadlight, as well as without glass and closed deadlight, with the following test pressure:

Round Window Type	*Test Pressure in* kPa	
	With Glass and Open Deadlight	With glass and Closed Deadlight
Heavy	150	100
Medium	75	50
Light	35	35

9.1.6 The arrangement for testing round windows both bolted and welded types are shown in Fig. 4 and 5 respectively.

9.2 On-Board Testing

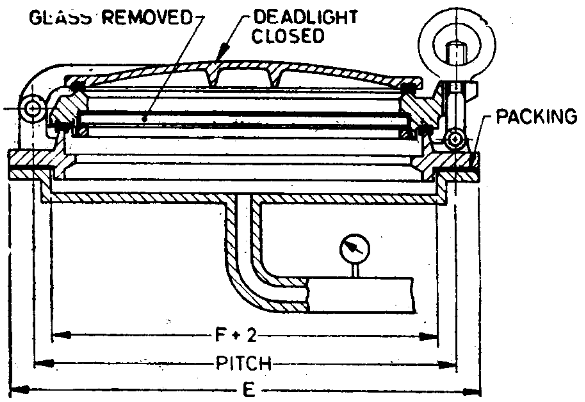
9.2.1 To ensure that the windows and packings are weathertight when installed on boardship, a hose test shall be carried out by means of a 12·5 mm nozzle connected to a suitable hose, held at a distance not exceeding 1·5 m with an outlet pressure of 200 kPa.

10 DESIGNATION

10.1 Ships' round windows shall be designated as follows:

a) The nominal dimension;

b) The type, heavy, medium or light by the Letters A, B, C respectively;



F External Diameter of Spigot on Main Frame
E Outer Diameter of Main Frame

FIG. 4 TEST RIG FOR ROUND WINDOWS (BOLTED) WITH DEADLIGHT CLOSED

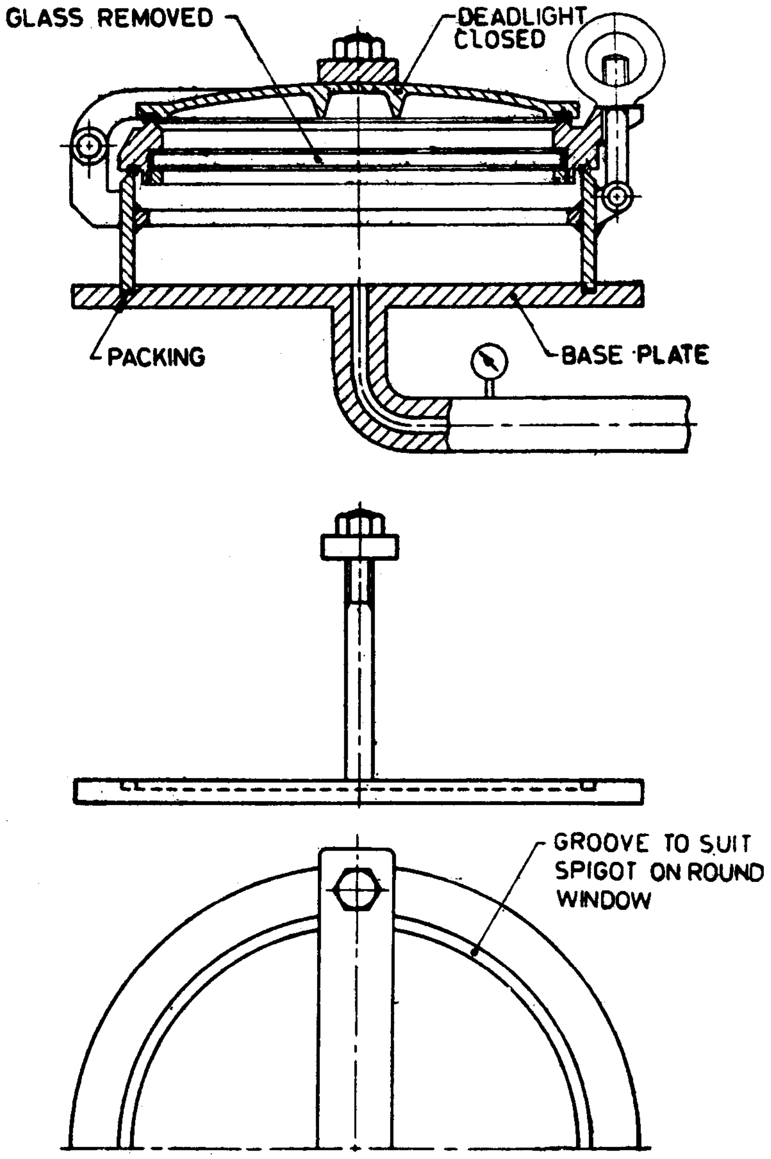


FIG. 5 TEST RIG FOR ROUND WINDOWS (WELDED) WITH DEADLIGHT CLOSED

c) Right-or-left-hand opening by the letters R or L;

d) Opening or non-opening and with or without deadlights, the letter 'D' indicating deadlight, and the letter 'O' for opening type;

e) When deadlight and glass holder have a common hinge, the letter 'C' indicating the same;

f) The number of this standard; and

g) Material.

Example:

A ships' round window with common hinge of heavy type and 300 mm size, righthand, opening with deadlight of aluminium alloy shall be designated as:

Ships' Round Window 300 ARDOC IS 5474 (Part 1):

11 MARKING

11.1 The round window shall be marked on the main frame or another metallic main component part with the letter for type (A, B or C).

Table 1 Material Used for the Construction of Ships' Round Windows

(*Clauses* 6.1 *and* 7.1)

Type	Brass	Aluminium Alloys	Gunmetal	Malleable Cast Iron	Steel
Sand castings	IS 292 : 1983 LC B2	IS 617 : 1975 5230 4600 4450	IS 318 : 1981 LT B2 LT B1	IS 2108 : 1977 BM 310 IS 2107 : 1977 WM 340	
Die casting	IS 1264 : 1989 DCB1				
Casting (by other methods)					IS 1030 : 1982 Grade 23-45
Plate					IS 2062 : 1984 IS 3039 : 1988 or equivalent
Naval die castings	IS 1264 : 1989 DCB1 DCB2				
Wrought corrosion resistant	IS 291 : 1989 Grade 1				IS 1570 (Part 5) : 1985 ×04Cr 18 Ni 10 Ti ×04Cr 18 Ni 10 Nb ×04Cr 17 Ni 12 Mo2
Cast corrosion resistant					IS 1039 : 1982

Table 2 Minimum Tensile Strength and Elongation

(*Clauses* 7.1 *and* 7.2)

Type of Round Window	Material	Minimum Tensile Strength N/mm^2			Minimum Elongation Percent
		Main Frame	Glass Holder	Dead light	
Heavy	Cast steel Mild steel Malleable cast iron Spheroidal graphite cast iron Brass Gunmetal	300	300	300	15
Medium	Cast steel Mild steel Malleable cast iron Spheroidal graphite cast iron Brass	180	180	180	10
Light	Cast steel Mild steel Malleable cast iron Spheroidal graphite cast iron Brass Aluminium alloy	140	140	140	3

NOTES

1 The values for the minimum tensile strength and elongation as indicated in the table are acceptable for the types of round windows given. However, the materials used should conform to the relevant standards given in Table 1.

2 Deadlights shall be provided with heavy and medium types. In the case of light type, the deadlight shall be provided as required.

Table 3 Thread Dimensions for Retaining Rings

(*Clauses* 7.2.3 *and* 7.2.6.1)

D (mm)	200	250	300	350	400	450
Thread Size (mm)	M220×2	M270×2	M325×2	M375×2	M425×2	M475×2

Table 4 Minimum Requirements for Tensile Strength and Elongation of Materials for Swing Bolts, Pins and Nuts

(*Clause* 7.2.6)

Type of Round Window	Swing Bolt and Pin		Nut	
	Minimum Tensile Strength N/mm^2	Elongation Percent	Minimum Tensils Strength N/mm^2	Elongation Percent
Heavy	350	20	250	14
Medium	350	15	250	14
Light	250	14	180	8

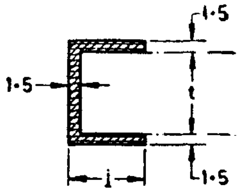
NOTES

1 The values for the minimum tensile strength and elongation as indicated in the table are acceptable for types of round window given. However, the materials used should comply to the relevant standards given in Table 1.

2 The materials should be corrosion resistant and should not affect the corrosion resistance of other parts of the round window.

Table 5 Dimensions of Rubber Channel for Fixing Glass

(*Clause* 8.1)



t = GLASS THICKNESS

All dimensions in millimetres.

Nominal Size d_1	Type of Round Windows			
	Light		Medium	
	t	j	t	j
200	6	9	8	9
250	6	9	8	9
300	8	11	10	11
350	8	11	12	11
400	10	11	12	11
450	10	11	15	11

Indian Standard

SHIPBUILDING — ROUND WINDOWS (SIDE SCUTTLES)

PART 2 HEAVY (TYPE A) ROUND WINDOWS — DIMENSIONS

(First Revision)

1 SCOPE

1.1 This standard (Part 2) specifies materials and dimensions of heavy (Type A) ships' round windows.

2 TERMINOLOGY

2.1 The terms and definitions given in IS 5474 (Part 1) : 1989 shall apply.

3 MATERIAL

3.1 The material used for the construction of round windows shall be according to IS 5474 (Part 1) : 1989.

4 DIMENSIONS

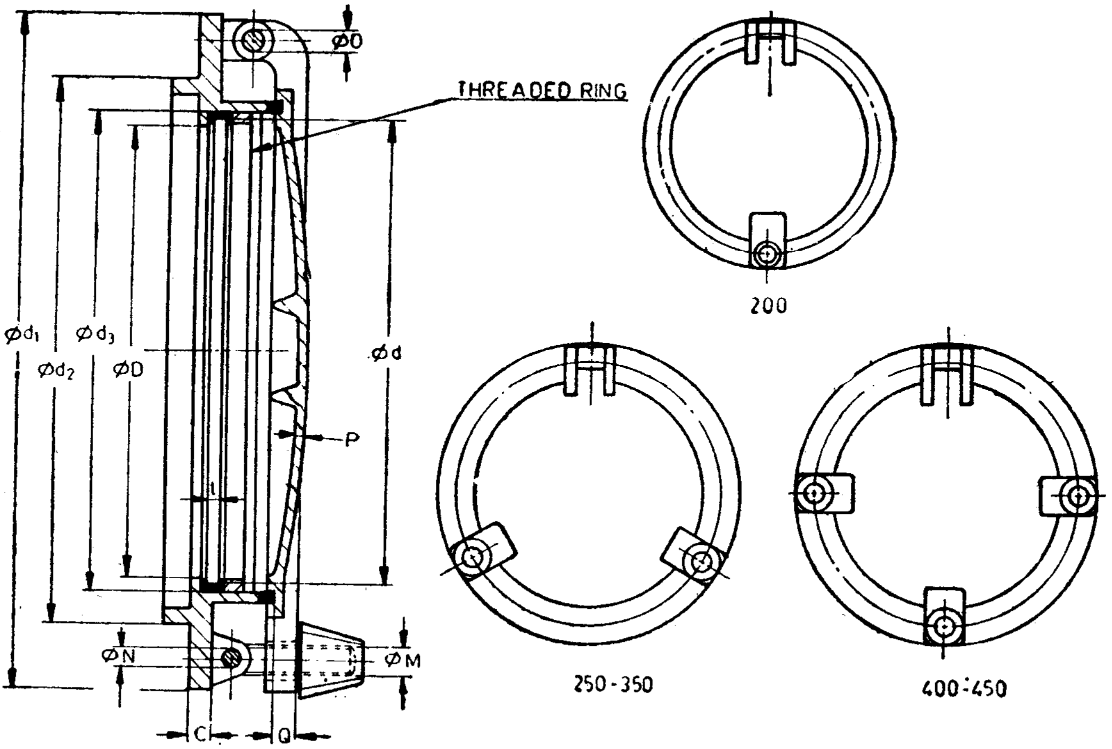
4.1 The dimensions of the round windows are given in Tables 1 to 4.

5 TESTS

5.1 The round windows shall be tested according to IS 5474 (Part 1) ; 1989.

Table 1 Non-Opening Round Windows (Bolted) Type A Heavy Series with Deadlight

(*Clause* 4.1)



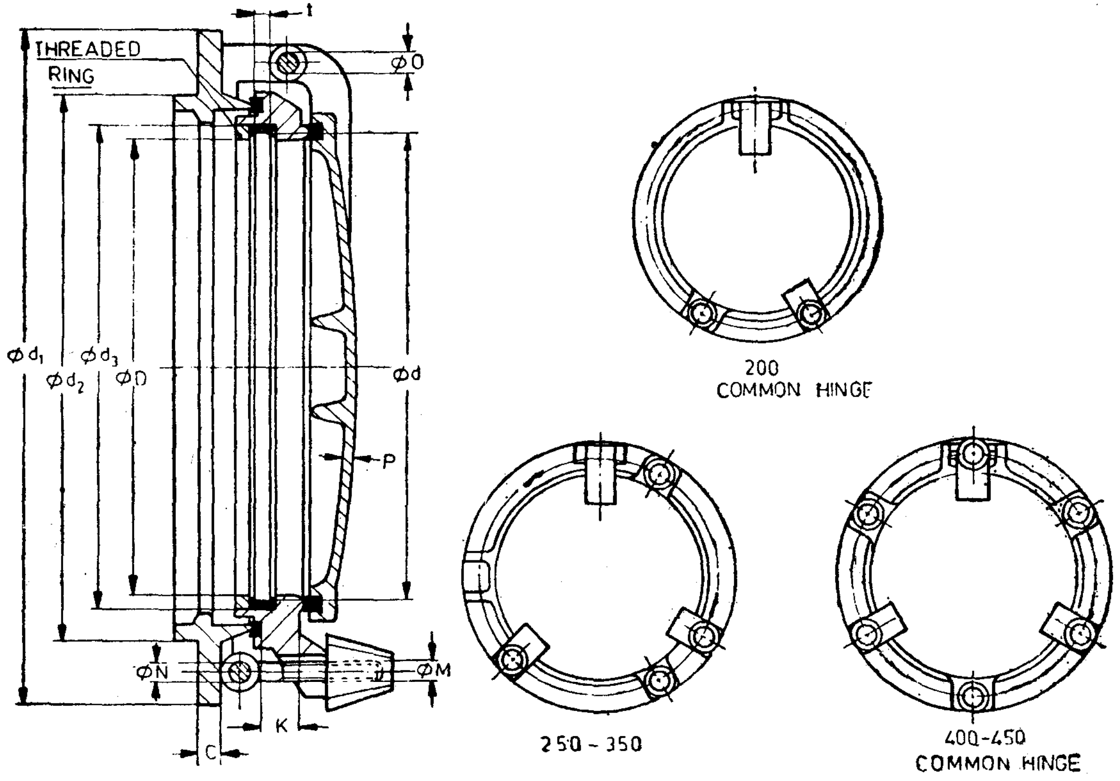
All dimensions in millimetres.

Reference Letter	Description						
*D	Nominal size of round windows and clear light size	200	250	300	350	400	450
*d_1	Maximum outside diameter of main frame	356	406	456	506	556	600
*d_2	Outside diameter of spigot of main frame	250	305	360	410	460	510
*d_3	Overall diameter of recess in glassholder	217	267	322	372	422	472
*t	Nominal thickness of toughened glass	10	12	15	15	19	19
*d	Diameter of glass	213 to 215	253 to 265	316 to 319	366 to 369	416 to 419	466 to 469
C	Thickness of main frame	12	12	12	12	12	12
E	Number of main frame securing bolts	8	8	8	12	12	12
F	Diameter of main frame securing bolts	16	16	16	16	16	16
L	Number of swing bolts for deadlight	1	2	2	2	3	3
M	Diameter of swing bolts for deadlight	22	22	22	22	22	22
N	Diameter of hinge pin for swing bolts for deadlight	14	14	14	14	14	14
O	Diameter of hinge pin for deadlight	16	16	16	20	20	20
P	Thickness of cast deadlight	10	10	12	12	12	14
	Thickness of fabricated deadlight	12	12	16	16	16	16
Q	Thickness of cast deadlight lugs over recess for rubber ring	24	24	28	28	32	32

*These dimensions have been standardized by ISO.

Table 2 Opening Round Windows (Bolted) Type A Heavy Series with Deadlight

(*Clause* 4.1)



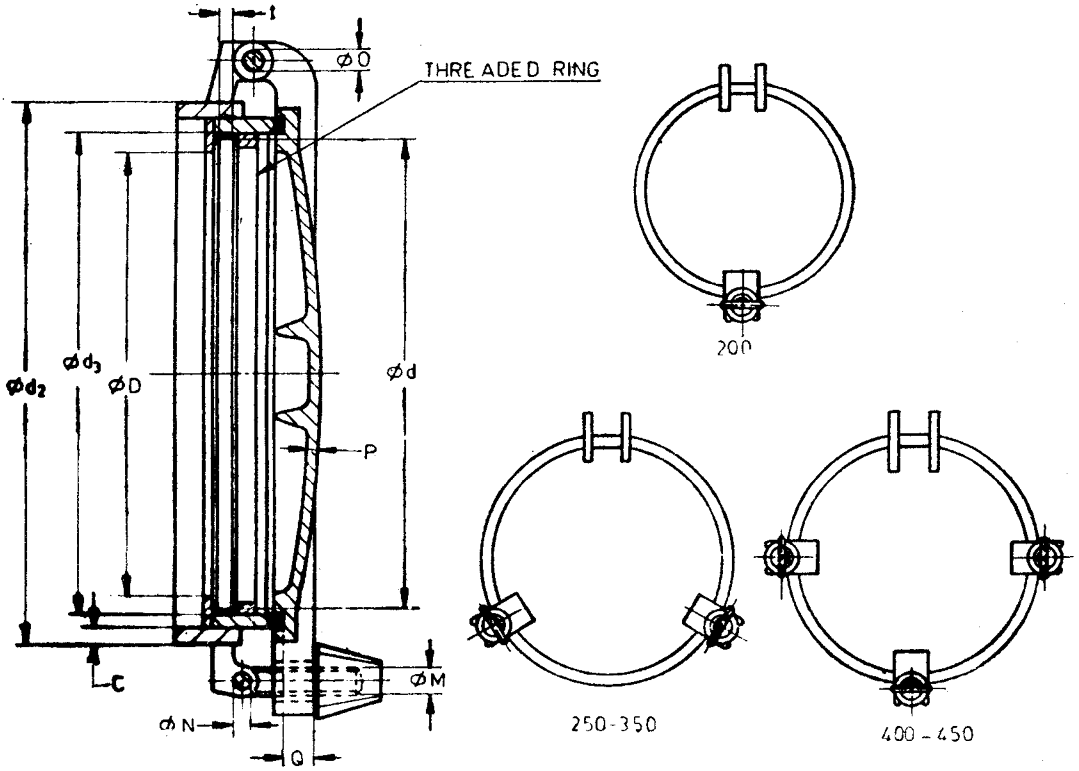
All dimensions in millimetres.

Reference Letter	Description						
*D	Nominal size of round windows and clear light size	200	250	300	350	400	450
*d_1	Maximum outside diameter of main frame	356	406	456	506	556	600
*d_2	Outside diameter of spigot of main frame	250	305	360	410	460	510
*d_3	Overall diameter of recess in glassholder	217	267	322	372	422	472
*t	Nominal thickness of toughened glass	10	12	15	15	19	19
*d	Diameter of glass	213 to 215	263 to 265	316 to 319	366 to 369	416 to 419	466 to 469
C	Thickness of main frame	12	12	12	12	12	12
E	Number of main frame securing bolts	8	8	8	8	8	8
F	Diameter of main frame securing bolts	16	16	16	16	16	16
K	Thickness of glassholder lugs over recess rubber ring	16	16	16	16	16	16
L	Number of swing bolts for glassholder/deadlight	1/1	2/2	2/2	2/2	3/3	3/3
M	Diameter swing bolts for deadlight and glassholder	22	22	22	22	22	22
N	Diameter of hinge pin for swing bolts for	14	14	14	14	14	14
O	Diameter of hinge pin for glassholder and deadlight	16	16	16	20	20	20
P	Thickness of cast deadlight	10	10	12	12	12	14
	Thickness of fabricated deadlight	12	12	16	16	16	16
Q	Thickness of cast deadlight lugs over recess for rubber ring	24	24	28	28	32	32

*These dimensions have been standardized by ISO.

Table 3 Non-opening Round Windows (Welded) Type A Heavy Series with Deadlight

(*Clause* 4.1)



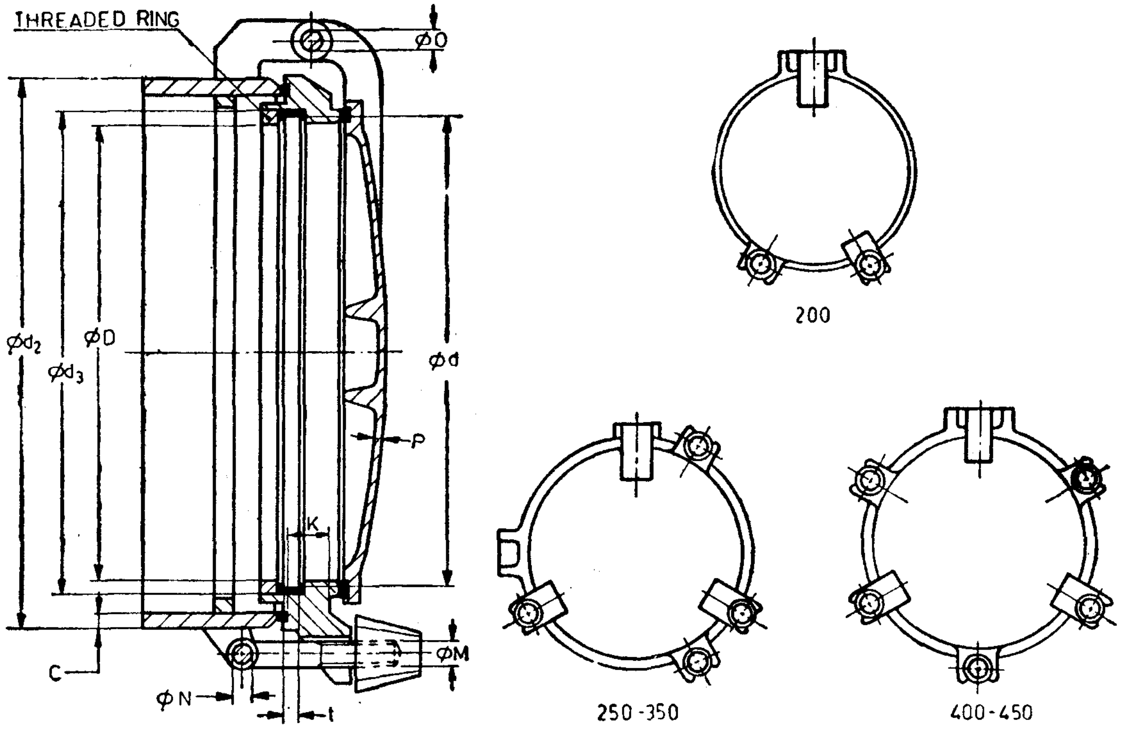
All dimensions in millimetres.

Reference Letter	Description						
*D	Nominal size of round windows and clear light size	200	250	300	350	400	450
*d_2	Outside diameter of spigot of main frame	250	305	360	410	460	510
*d_3	Overall diameter of recess in glassholder	217	267	322	372	422	472
*t	Nominal thickness of toughened glass	10	12	15	15	19	19
*d	Diameter of glass	213 to 215	263 to 265	316 to 319	360 to 369	416 to 419	466 to 469
C	Thickness of main frame	12	12	12	12	12	12
L	Number of swing bolts for deadlight	1	2	2	2	3	3
M	Diameter of swing bolts for deadlight	22	22	22	22	22	24
N	Diameter of hinge pin for swing bolts for deadlight	14	14	14	14	14	16
O	Diameter of hinge pin for deadlight	16	16	16	20	20	22
P	Thickness of cast deadlight	10	10	12	12	12	12
	Thickness of M.S. fabricated deadlight	12	12	16	16	16	16
Q	Thickness of cast deadlight lugs over recess of rubber ring	24	24	28	28	32	32

*These dimensions have been standardized by ISO.

Table 4 Opening Round Windows (Welded) Type A Heavy Series with Deadlight

(*Clause* 4.1)



All dimensions in millimetres.

Reference Letter	Description						
*D	Nominal size of round windows and clear	200	250	300	350	400	450
*d_2	Outside diameter of spigot of main frame	250	305	360	410	460	510
*d_3	Overall diameter of recess in glassholder	217	267	322	372	422	472
*t	Nominal thickness of toughened glass	10	12	15	15	19	19
*d	Diameter of glass	213 to 215	263 to 265	316 to 318	366 to 369	416 to 419	466 to 469
C	Thickness of main frame	12	12	12	12	12	12
K	Thickness of glassholder lugs over recess for rubber ring	16	16	16	16	16	16
L	Number of swing bolts for glassholder/deadlight	1/1	2/2	2/2	2/2	3/3	3/3
M	Diameter of swing bolts for glassholder	22	22	22	22	22	24
N	Diameter of hinge pin for swing bolts	14	14	14	14	14	16
O	Diameter of hinge pin for glassholder	16	16	16	20	20	22
P	Thickness of cast deadlight	10	10	12	12	12	12
	Thickness of fabricated deadlight	12	12	16	16	16	16
Q	Thickness of cast deadlight lugs over recess for ruber ring	24	24	28	28	32	32

*These dimensions have been standardized by ISO.

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Indian Standard

SHIPBUILDING — ROUND WINDOWS (SIDE SCUTTLES)

PART 3 MEDIUM (TYPE B) ROUND WINDOWS – DIMENSIONS

(First Revision)

1 SCOPE

1.1 This standard (Part 3) specifies materials and dimensions of medium (Type B) ships' round windows.

2 TERMINOLOGY

2.1 The terms and definitions given in IS 5474 (Part 1) : 1989 shall apply.

3 MATERIAL

3.1 The material used for the construction of round windows shall be according to IS 5474 (Part 1) : 1959.

4 DIMENSIONS

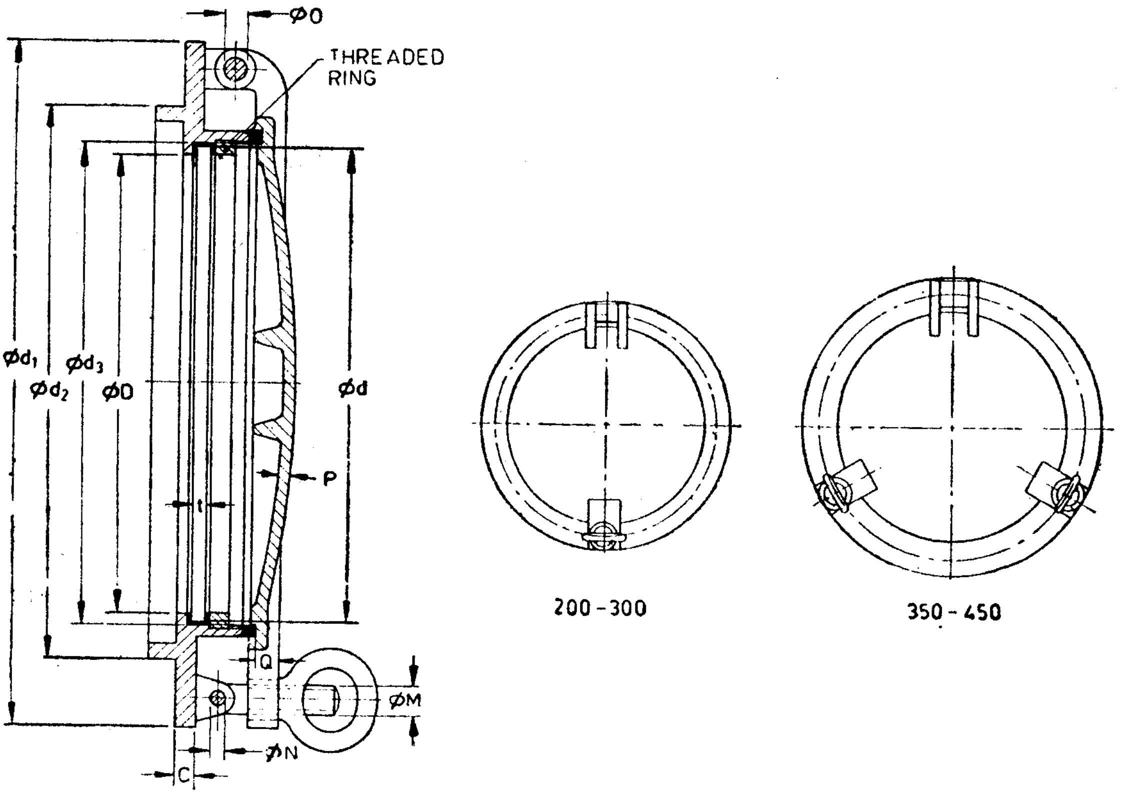
4.1 The dimensions of the round windows are given in Table 1 to 6.

5 TESTS

5.1 The round windows shall be tested according to IS 5474 (Part 1) : 1989.

Table 1 Non-opening Round Windows (Bolted) Type B Medium Series with Deadlight

(*Clause* 4.1)



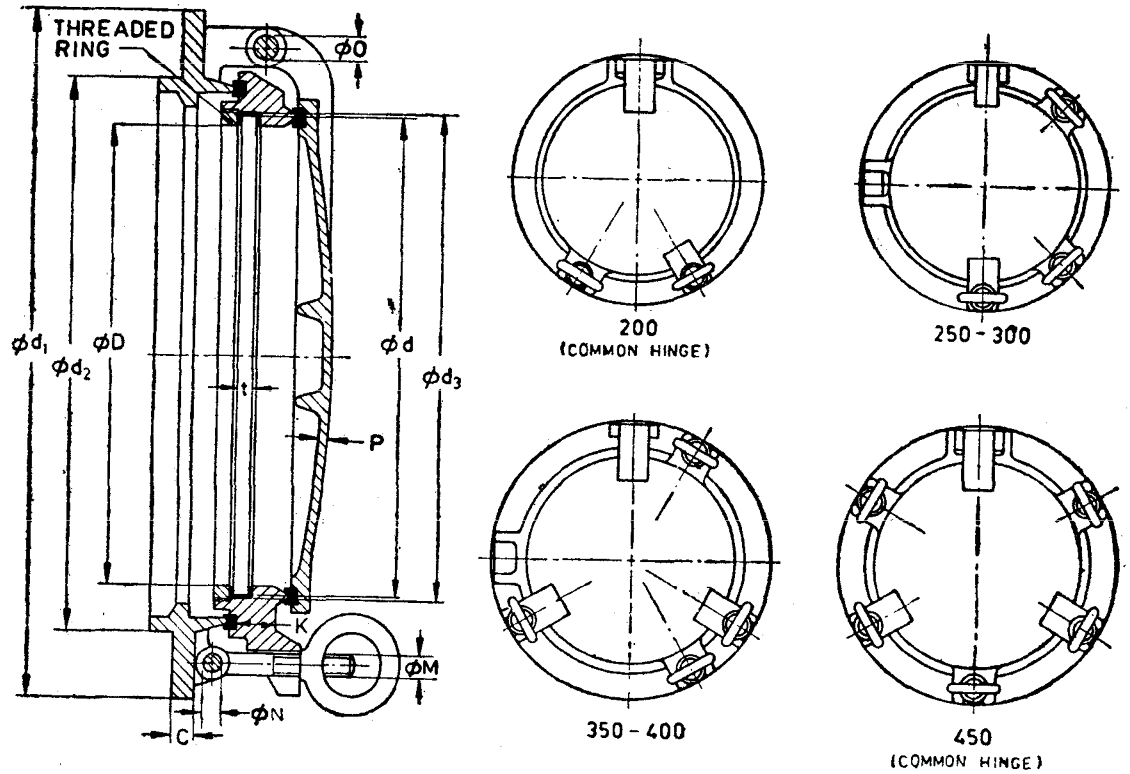
All dimensions in millimetres.

Reference Letter	Description						
*D	Nominal size of round windows and clear light size	200	250	300	350	400	450
*d_1	Maximum outside diameter of main frame	340	395	450	500	550	600
*d_2	Outside diameter of spigot of main frame	250	305	360	410	460	510
*d_3	Overall diameter of recess in glassholder	217	267	322	372	422	472
*t	Nominal thickness of toughened glass	8	8	10	12	12	15
*d	Diameter of glass	213 to 215	263 to 265	316 to 319	366 to 369	416 to 419	466 to 469
C	Thickness of main frame	10	10	10	10	10	10
E	Number of main frame securing bolts	8	5	8	12	12	12
F	Diameter of main frame securing bolts	16	16	16	16	16	16
L	Number of swing bolts for deadlight	1	1	1	2	2	2
M	Diameter of swing bolts for deadlight	20	20	20	20	20	20
N	Diameter of hinge pin for swing bolts	12	12	12	12	12	12
O	Diameter of hinge pin for deadlight	16	16	16	16	16	16
P	Thickness of cast deadlight	6	8	8	8	8	10
	Thickness of fabricated deadlight	10	10	12	12	12	12
Q	Thickness of cast deadlight lugs over recess	16	19	22	25	29	32

*These dimensions have been standardized by ISO.

Table 2 Opening Round Windows (Bolted) Type B Medium Series with Deadlight

(*Clause* 4.1)



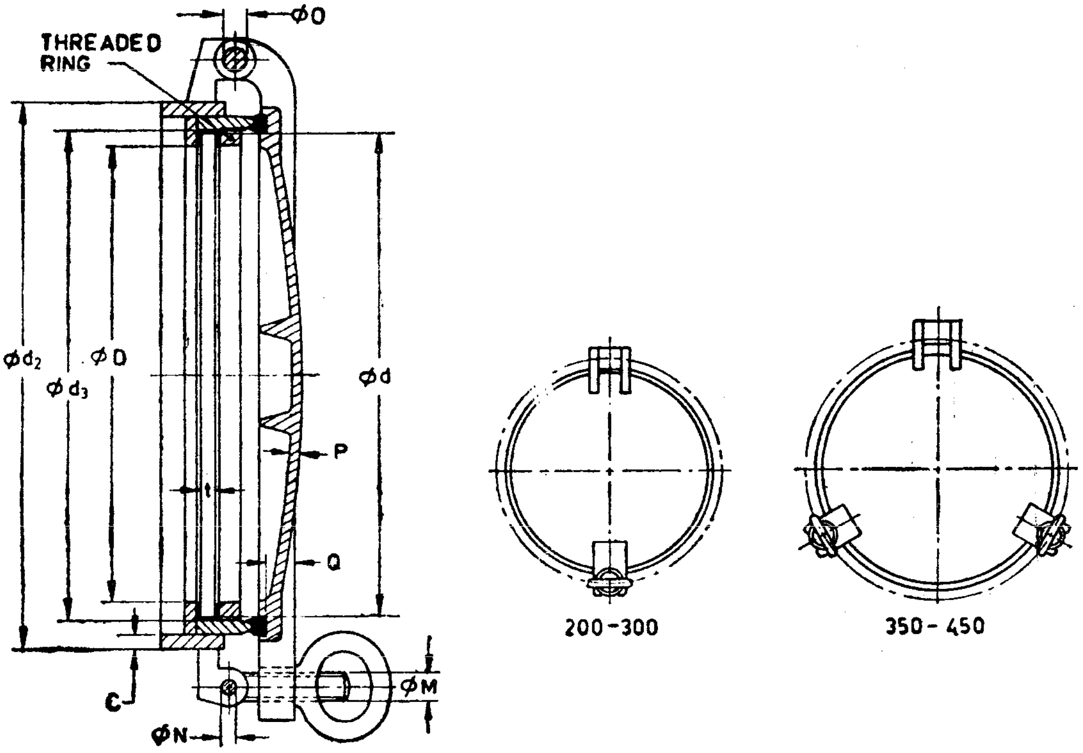
All dimensions in millimetres.

Reference Letter	Description						
*D	Nominal size of round windows and clear light size	200	250	300	350	400	450
*d_1	Maximum outside diameter of main frame	340	395	450	500	550	600
*d_2	Outside diameter of spigot of main frame	250	305	360	410	460	510
*d_3	Overall diameter of recess in glassholder	217	267	322	372	422	472
*t	Nominal thickness of toughened glass	8	8	10	12	12	15
*d	Diameter of glass	213 to 215	263 to 265	316 to 319	366 to 369	416 to 419	466 to 469
C	Thickness of main frame	10	10	10	10	10	10
E	Number of main frame securing bolts	8	8	8	12	12	12
F	Diameter of main frame securing bolts	16	16	16	16	16	16
K	Thickness of glassholder lugs over recess for rubber ring	11	11	11	11	11	11
L	Number of swing bolts for glassholder/deadlight	1/1	2/1	2/1	2/2	2/2	3/2
M	Diameter of swing bolts for deadlight and glassholder	20	20	20	20	20	20
N	Diameter of hinge pin for swing bolts for deadlight and glassholder	12	12	12	12	12	12
O	Diameter of hinge pin for deadlight and glassholder	16	16	16	16	16	16
P	Thickness of cast deadlight	6	8	8	8	8	10
	Thickness of fabricated deadlight	10	10	12	12	12	12
Q	Thickness of cast deadlight lugs over recess for rubber ring	16	19	22	25	29	32

*These dimensions have been standardized by ISO.

Table 3 Non-Opening Round Windows (Welded) Type B Medium Series with Deadlight

(*Clause* 4.1)



200-300

350-450

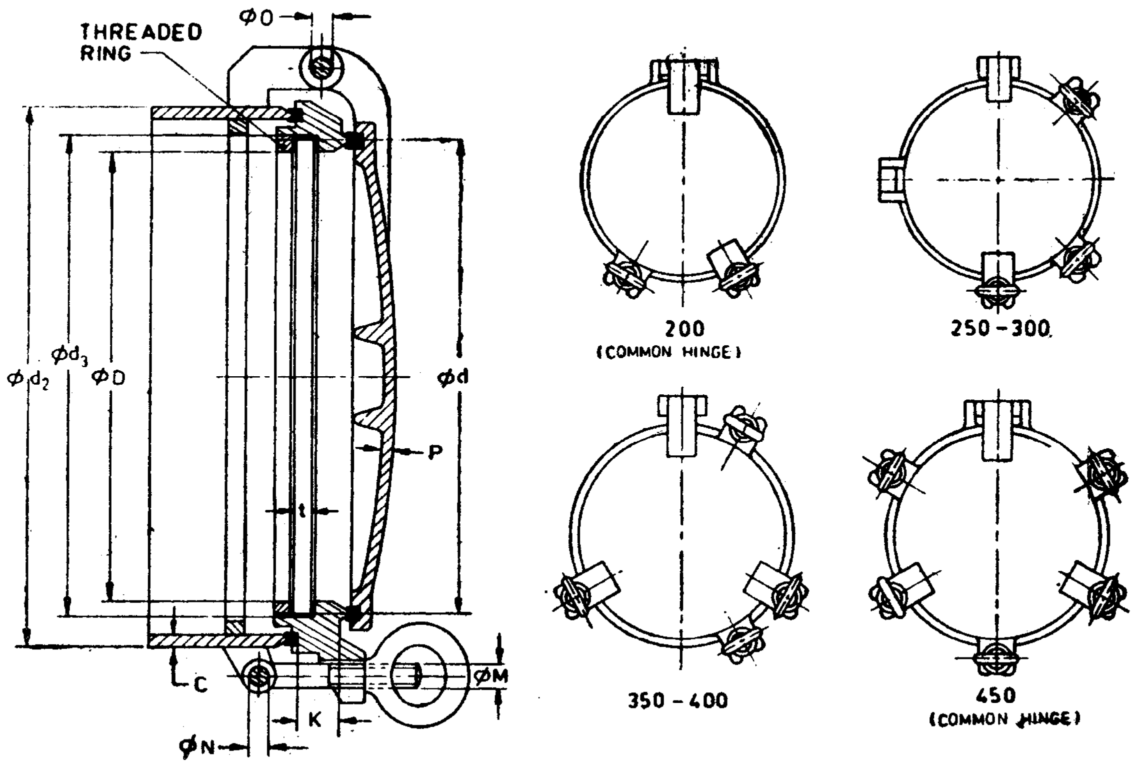
All dimensions in millimetres.

Reference Letter	Description						
*D	Nominal size of round windows and clear light size	200	250	300	350	400	450
*d_2	Outside diameter of spigot of main frame	250	305	360	410	460	510
*d_3	Overall diameter of recess in glassholder	217	267	322	372	422	472
*t	Nominal thickness of toughened glass	8	8	10	12	12	15
*d	Diameter of glass	213 to 215	263 to 265	316 to 319	366 to 369	416 to 419	466 to 469
C	Thickness of main frame	8	10	10	10	10	10
L	Number of swing bolts for deadlight	1	1	1	2	2	2
M	Diameter of swing bolts for deadlight	20	20	20	20	20	20
N	Diameter of hinge pin for swing bolts	12	12	12	12	12	12
O	Diameter of hinge pin for deadlight	16	16	16	16	16	16
P	Thickness of cast deadlight	6	8	8	8	8	8
	Thickness of fabricated deadlight	10	10	12	12	112	12
Q	Thickness of cast deadlight lugs over recess for rubber ring	16	19	22	25	29	32

*These dimensions have been standardized by ISO.

Table 4 Opening Round Windows (Welded) Type B Medium Series with Deadlight

(*Clause* 4.1)



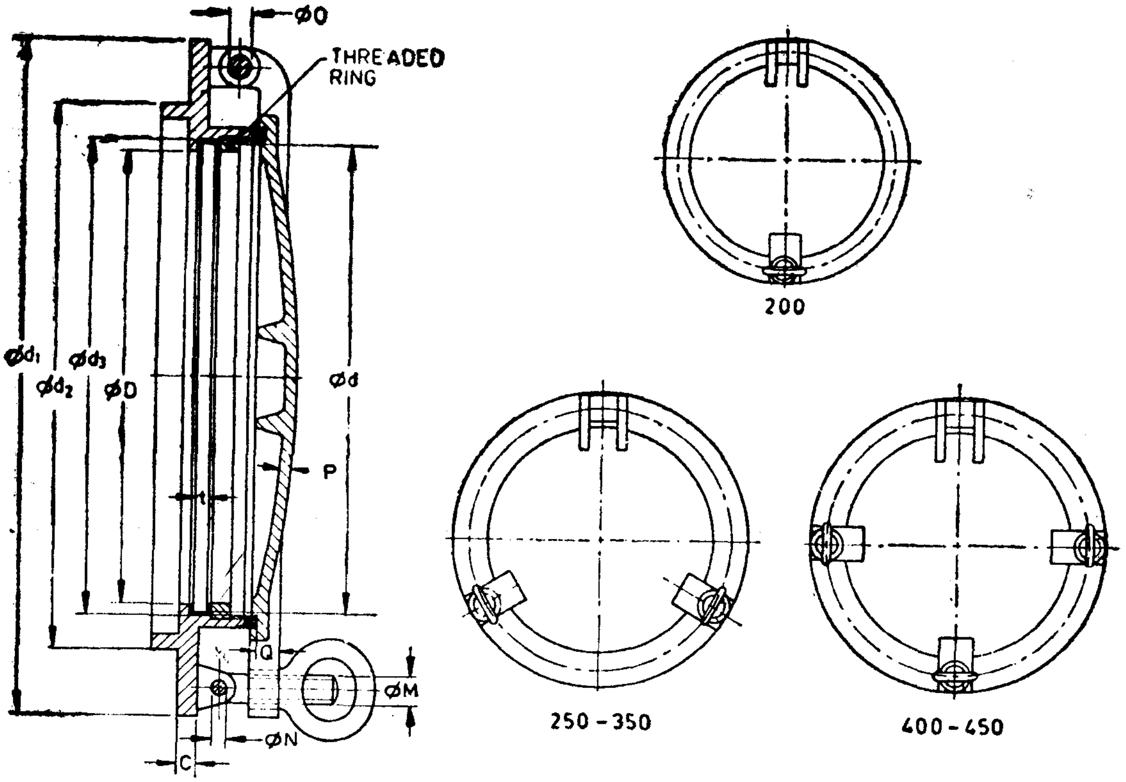
All dimensions in millimetres.

Reference Letter	Description						
*D	Nominal size of round windows and clear light size	200	250	300	350	400	450
*d_2	Outside diameter of spigot of main frame	250	305	360	410	460	510
*d_3	Overall diameter of recess in glassholder	217	267	322	372	422	472
*t	Nominal thickness of toughened glass	8	8	10	12	12	15
*d	Diameter of glass	213 to 215	263 to 265	316 to 319	366 to 369	416 to 419	466 to 469
C	Thickness of main frame	8	10	10	10	10	10
K	Thickness of glassholder lugs over recess for rubber ring	12	16	19	22	25	29
L	Number of swing bolts for glassholder/deadlight	1/1	2/1	2/1	2/2	2/2	3/2
M	Diameter of swing bolts for glassholder and deadlight	20	20	20	20	20	20
N	Diameter of hinge pin for swing bolts for glassholder deadlight	12	12	12	12	12	12
O	Diameter of hinge pin for glassholder and deadlight	16	16	16	16	16	16
P	Thickness of cast deadlight	6	8	8	8	8	8
	Thickness of fabricated deadlight	10	10	12	12	12	12
Q	Thickness of deadlight lugs over recess for rubber ring	16	19	22	25	29	32

*These dimensions have been standardized by ISO.

Table 5 Non-Opening Round Windows (Aluminium) Bolted Type B Medium Series with Deadlight

(*Clause* 4.1)

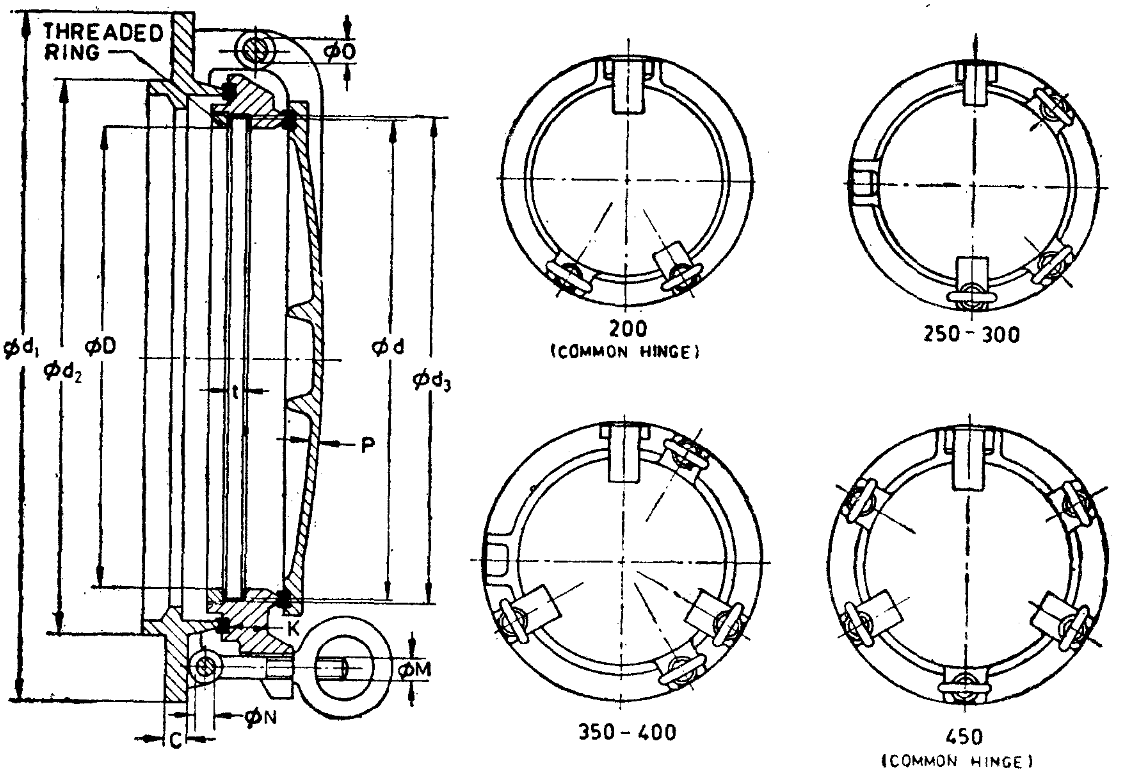


All dimensions in millimetres.

Reference Letter	Description						
*D	Nominal size of round windows and clear light size	200	250	300	350	400	450
*d_1	Maximum outside diameter of main frame	340	395	450	500	550	600
*d_2	Outside diameter of spigot of main frame	250	305	360	410	460	510
*d_3	Overall diameter of recess in glassholder	217	267	322	372	422	472
*t	Nominal thickness of toughened glass	8	8	10	12	12	12
*d	Diameter of glass	213 to 215	263 to 265	316 to 319	366 to 369	416 to 419	466 to 469
C	Thickness of main frame	10	10	10	10	10	10
E	Number of main frame securing bolts	8	8	8	12	12	12
F	Diameter of main frame securing bolts	16	16	16	16	16	16
L	Number of swing bolts for deadlight	1	2	2	2	3	3
M	Diameter of swing bolts for deadlight	20	20	20	20	20	20
N	Diameter of hinge pin for swing bolts for deadlight	12	12	12	12	12	12
O	Diameter of hinge pin for deadlight	16	16	16	16	16	16
P	Thicknesss of cast deadlight	6	8	8	8	8	10
	Thickness of fabricated deadlight	10	10	12	12	12	12
Q	Thickness of deadlight lugs recess for rubber ring	16	19	22	25	29	32

*These dimensions have been standardized by ISO.

Table 6 Opening Round Windows (Aluminium) Bolted Type B Medium Series with Deadlight
(*Clause* 4.1)



200 (COMMON HINGE)

250 - 300

350 - 400

450 (COMMON HINGE)

All dimension in millimetres.

Reference Letter	Description						
*D	Nominal size of round windows and clear light size	200	250	300	350	400	450
*d_1	Maximum outside diameter of main frame	340	395	450	500	550	600
*d_2	Outside diameter of spigot of main frame	250	305	360	410	460	510
*d_3	Overall diameter of recess in glassholder	217	267	322	372	422	472
*t	Nominal thickness of toughened glass	8	8	10	12	12	15
*d	Diameter of glass	213 to 215	263 to 265	316 to 319	366 to 369	416 to 419	466 to 469
C	Thickness of main frame	10	10	10	10	10	10
E	Number of main frame securing bolts	8	8	8	12	12	12
F	Diameter of main frame securing bolts	16	16	16	16	16	16
K	Thickness of glassholder lugs over recess for rubber ring	11	11	11	11	11	11
L	Number of swing bolts for glassholder and deadlight	1/1	2/1	2/1	2/2	2/2	3/2
M	Diameter of swing bolts for glassholder	20	20	20	20	20	20
N	Diameter of hinge pin for swing bolts for glassholder and deadlight	12	12	12	12	12	12
O	Diameter of hinge pin for glassholder and deadlight	16	16	16	16	16	16
P	Thickness of cast deadlight	6	8	8	8	8	10
	Thickness of fabricated deadlight	10	10	12	12	12	12
Q	Thickness of cast deadlight lugs over recess for rubber ring	16	19	22	25	29	32

*These dimensions have been standardized by ISO.

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Indian Standard

SHIPBUILDING — ROUND WINDOWS (SIDE SCUTTLES)

PART 4 LIGHT (TYPE C) ROUND WINDOWS — DIMENSIONS

(First Revision)

1 SCOPE

1.1 This standard (Part 4) specifies materials and dimensions of light (Type C) ships' round windows.

2 TERMINOLOGY

2.1 The terms and definitions given in IS 5474 (Part 1) : 1989 shall apply.

3 MATERIAL

3.1 The material used for the construction of round windows shall be according to IS 5474 (Part 1) : 1989.

4 DIMENSIONS

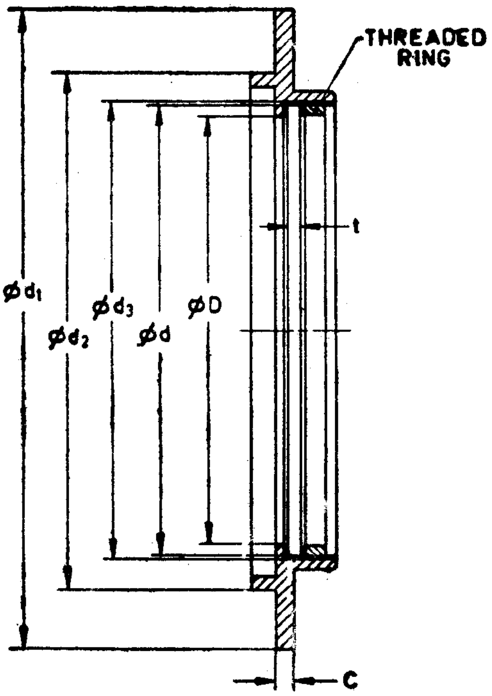
4.1 The dimensions of the round windows are given in Table 1 to 6.

5 TESTS

5.1 The round windows shall be tested according to IS 5474 (Part 1) : 1989.

Table 1 Non-Opening Round Windows (Bolted) Type C Light Series without Deadlight

(*Clause* 4.1)



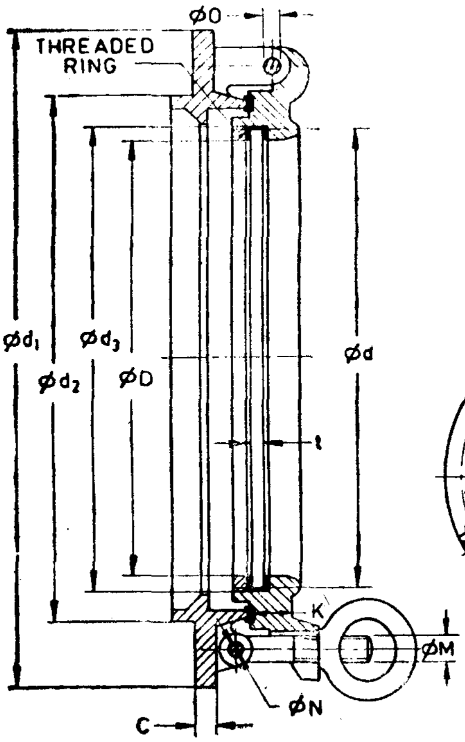
All dimensions in millimetres,

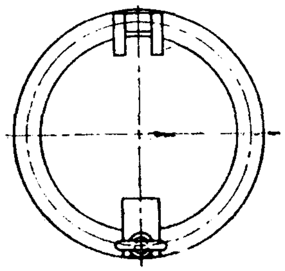
Reference Letter	Description						
*D	Nominal size of round windows and clear light size	200	250	300	350	400	450
*d_1	Maximum outside diameter of main frame	340	395	450	500	550	600
*d_2	Outside diameter of spigot of main frame	250	305	360	410	460	510
*d_3	Overall diameter of recess in glassholder	217	267	322	372	422	472
*t	Nominal thickness of toughened glass	6	6	8	8	10	10
*d	Diameter of glass	213 to 215	263 to 265	316 to 319	366 to 369	416 to 419	466 to 469
C	Thickness of main frame	8	8	8	8	8	8
E	Number of main frame securing bolts	8	8	8	12	12	12
F	Diameter of main frame securing bolts	16	16	16	16	16	16

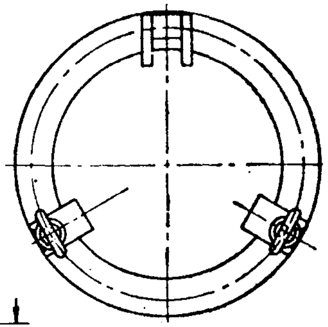
*These dimensions have been standardized by ISO.

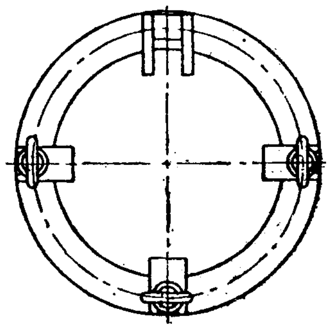
Table 2 Opening Round Windows (Bolted) Type C Light Series without Deadlight

(*Clause* 4.1)









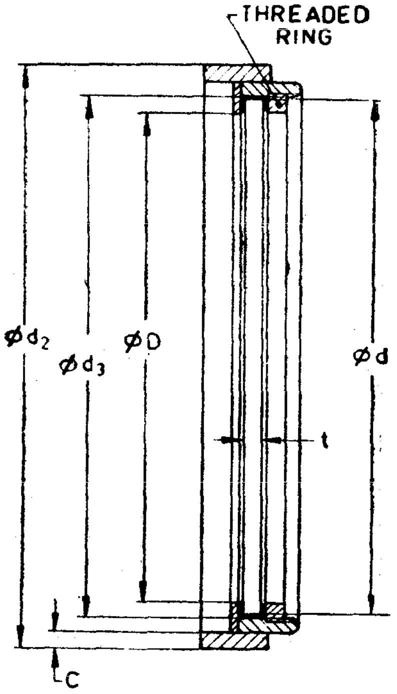
All dimensions in millimetres.

Reference Letter	Description						
*D	Nominal size of round window and clear light size	200	250	300	350	400	450
*d_1	Maximum outside diameter of main frame	340	395	450	500	550	600
*d_2	Outside diameter of spigot of main frame	250	305	360	410	460	510
*d_3	Overall diameter of recess in glassholder	217	267	322	372	422	472
*t	Nominal thickness of toughened glass	6	6	8	8	10	10
*d	Diameter of glass	213 to 215	263 to 265	316 to 319	366 to 369	416 to 419	516 to 517
C	Thickness of main frame	8	8	8	8	8	10
E	Number of main frame securing bolts	8	8	8	12	12	12
F	Diameter of main frame securing bolts	16	16	16	16	16	16
K	Thickness of glassholder lugs over recess for rubber ring	9	9	9	9	9	9
L	Number of swing bolts for glassholder	1	1	2	2	2	3
M	Diameter of swing bolts for glassholder	20	20	20	20	20	20
N	Diameter of hinge pin for swing bolts for glassholder	12	12	12	12	12	12
O	Diameter of hinge pin for glassholder	16	16	16	16	16	16

*These dimensions have been standardized by ISO.

Table 3 Non-Opening Round Windows (Welded) Type C Light Series without Deadlight

(*Clause* 4.1)



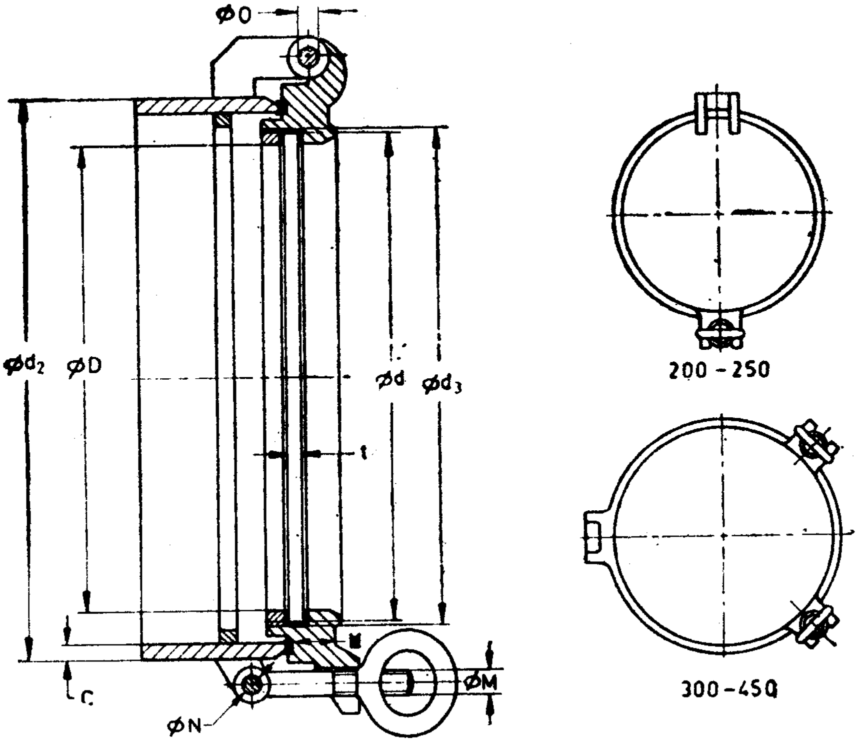
All dimensions in millimetres.

Reference Letter	Description						
*D	Nominal size of round windows and clear light size	200	250	300	350	400	450
*d_2	Outside diameter of spigot of main frame	250	305	360	410	460	510
*d_3	Overall diameter of recess in glassholder	217	267	322	372	422	472
*t	Nominal thickness of toughened glass	6	6	8	8	10	10
*d	Diameter of glass	213 to 215	263 to 265	316 to 319	366 to 369	416 to 419	466 to 469
C	Thickness of main frame	8	10	10	10	10	

*These dimensions have been standardized by ISO.

Table 4 Opening Round Windows (Welded) Type C Light Series without Deadlight

(*Clause* 4.1)



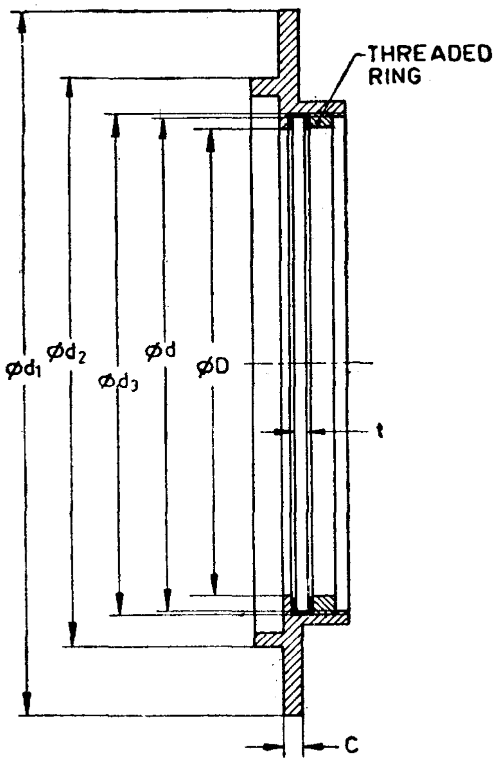
All dimensions in millimetres.

Reference Letter	Description						
**D*	Nominal size of round window and clear light size	200	250	300	350	400	450
*d_2	Outside diameter of spigot of main frame	250	305	360	410	460	510
*d_3	Overall diameter of recess in glassholder	217	267	322	372	422	471
**t*	Nominal thickness of toughened glass	6	6	8	8	10	10
**d*	Diameter of glass	213 to 215	263 to 265	316 to 319	366 to 369	416 to 419	466 to 469
C	Thickness of main frame	8	10	10	10	10	10
K	Thickness of glassholder lugs over recess for rubber ring	10	12	14	18	20	22
L	Number of swing bolts for glassholder	1	1	2	2	2	2
M	Diameter of swing bolts for glassholder	20	20	20	20	20	20
N	Diameter of hinge pin for swing bolts	12	12	12	12	12	12
O	Diameter of hinge pin for glassholder	16	16	16	16	16	16

*These dimensions have been standardized by ISO.

Table 5 Non-Opening Round Windows (Bolted) Aluminium Type C Light Series Without Deadlight

(*Clause* 4.1)



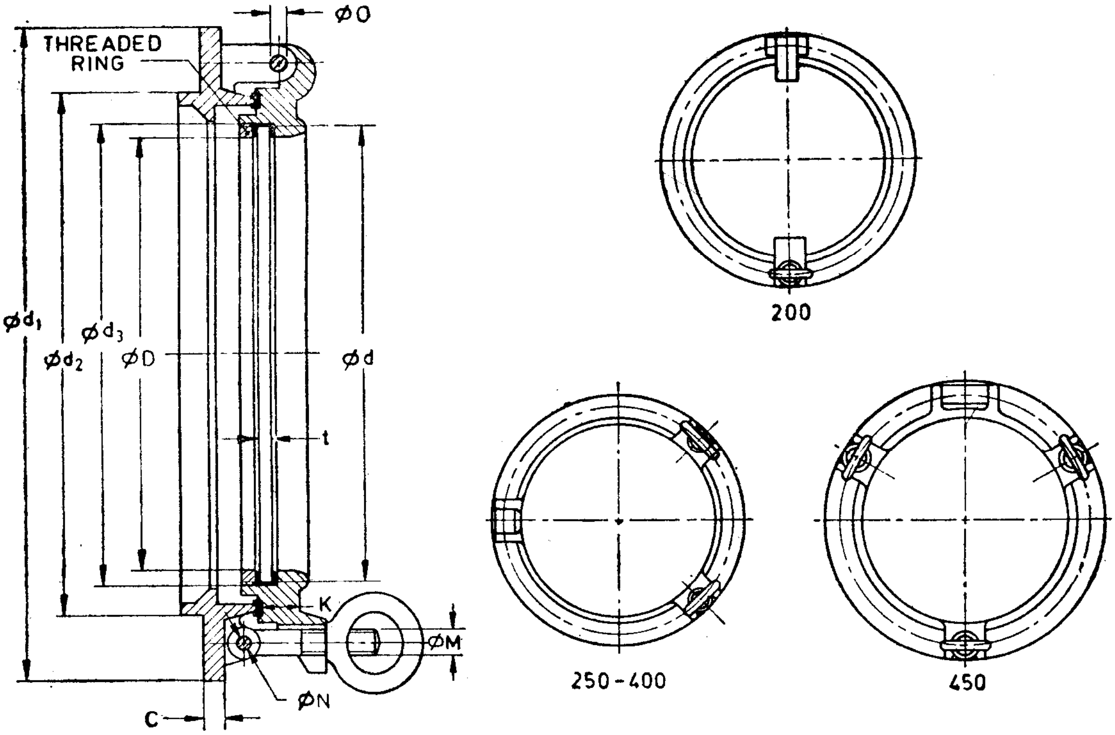
All dimensions in millimetres.

Reference Letter	Description						
**D*	Nominal size of round window and clear light size	200	250	300	350	400	450
*d_1	Maximum outside diameter of main frame	350	400	450	500	550	600
*d_2	Outside diameter of spigot of main frame	250	305	360	410	460	510
*d_3	Overall diameter of recess in glassholder	217	267	322	372	422	472
**t*	Nominal thickness of toughened glass	6	6	8	8	10	10
**d*	Diameter of glass	213 to 215	263 to 265	316 to 319	366 to 369	416 to 419	466 to 469
C	Thickness of main frame	8	8	8	8	8	8
E	Number of main frame securing bolts	8	8	8	12	12	12
F	Diameter of main frame securing bolts	16	16	16	16	16	16

*These dimensions have been standardized by ISO.

Table 6 Opening Round Windows (Bolted) Aluminium Type C Light Series without Deadlight

(*Clause* 4.1)



All dimensions in millimetres.

Reference Letter	Description						
**D*	Nominal size of round window and clear light size	200	250	300	350	400	450
*d_1	Maximum outside diameter of main frame	350	400	450	500	550	600
*d_2	Outside diameter of spigot of main frame	250	305	360	410	460	510
*d_3	Overall diameter of recess in glassholder	217	267	322	372	422	472
**t*	Nominal thickness of toughened glass	6	6	8	8	10	10
**d*	Diameter of glass	213 to 215	263 to 265	316 to 319	366 to 369	416 to 419	466 to 469
C	Thickness of main frame	8	8	8	8	8	8
E	Number of main frame securing bolts	8	8	8	12	12	12
F	Diameter of main frame securing bolts	16	16	16	16	16	16
K	Thickness of glassholder lugs over recess for rubber ring	9	9	9	9	9	9
L	Number of swing bolts for glassholder	1	2	2	2	2	3
M	Diameter of swing bolts for glassholder	20	20	20	20	20	20
N	Diameter of hinge pin for swing bolts	12	12	12	12	12	12
O	Diameter of hinge pin for glassholder	16	16	16	16	16	16

*These dimensions have been standardized by ISO.

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Indian Standard

SHIPBUILDING — ROUND WINDOWS (SIDE SCUTTLES)

PART 5 MANUFACTURE AND INSTALLATION ON BOARDSHIPS

(First Revision)

1 SCOPE

1.1 This standard specifies the precautions to be adopted during manufacture, assembly, installation and testing on boardship.

2 REFERENCES

2.1 The following Indian Standards are necessary adjuncts to this standard.

IS No.	*Title*
11914 : 1986	Glossary of terms for ships windows
5474 (Part 1) : 1989	Shipbuilding — Round windows (side scuttles) : Part 1 General requirements (*first revision*)

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 11914 : 1986 shall apply.

4 WORKMANSHIP AND FINISH

4.1 Casting shall be sound and free from any defects. Patching or welding of blow holes in any position shall not be permitted.

4.2 Edges of all parts shall be free from any exposed rough edges likely to cause injury to the hands and shall be rounded smooth.

4.3 Welding shall be of good quality.

4.4 Bearing surfaces and contact surfaces of cast type main frame and deadlight shall be machine finished.

4.5 Fabricated main frame, deadlight and their relevant lugs shall be machine finished to the sizes required before assembling a composite unit of each.

4.6 All swing bolts shall be machine finished.

4.7 All visible parts of glass holder, swing bolt nuts, etc, shall be polished and buffed to mirror finish and also sprayed with clear lacquer to protect the finish obtained.

4.8 Steel main frame and deadlights with relevant fittings shall be painted with two coats of synthetic red lead paint only after completion of inspection.

4.9 Rubber rings in glass holder and deadlight shall be moulded to the required sizes without joints.

4.10 Rubber channels for glazing glasses shall be continuous moulded rings.

4.11 Hole for hinge pin shall be drilled straight with the aid of suitable jig to ensure that centre line of pin shall be perfectly normal to a horizontal line joining the mid-point between the lugs and the centre of the round window when there is no deadlight.

4.11.1 When the deadlight is there, it shall be ensured that centre line of the hinge pin of glass holder is perfectly normal to the horizontal centre line of deadlight hinge pin.

4.11.2 Hinge pin shall be tight fit in main frame hinge lugs and loose fit in deadlight hinge lug or glass holder hinge lug without and slackness in hinge where all the lugs have through circular hole for hinge pins.

5 ASSEMBLY

5.1 All the hinges and lugs for every round window shall be precisely made and properly aligned with the help of appropriate jigs. Any slight variation in any part may result in improper functioning as the sizes and positions of individual parts are inter-related with each other.

5.2 The glass holder and deadlight shall be properly, uniformly and concentrically seated on the main frame.

5.3 The bolts shall swing out freely without fouling with the lugs.

5.4 Either glass holder or deadlight on closing shall make contact first on hinge side, when the glass holder and deadlight shall rest at 2° angle and shall have 2 mm compression in rubber ring throughout after fully tightening to ensure watertightness.

5.5 The rubber ring shall be secured firmly, tightly and uniformly in the grooves of the glass holder and deadlight by suitable adhesive. While fixing, it shall be ensured that the rubber is not damaged or cut as this would affect the watertightness.

5.6 Glazing of glass shall be done uniformly with the channel section, rubber ring and suitably putty to ensure watertightness.

5.7 All welding during fabrication of main frame and deadlight shall be done in proper sequence so as to avoid any distortion or warping in the finished product.

5.8 After assembling, every round window shall be kept in vertical position, as will be fitted on ship, and tested for its alignment and seating of glass holder and deadlight. It shall also be seen that glass holder or deadlight does not drop due to excess clearance in hinge alignment.

6 INSTALLATION ON BOARDSHIP

6.1 All round windows shall be complete and ready for fitting on boardship.

6.2 Bolted Round Windows

6.2.1 It shall be ensured that the steel bulkhead or shell are plane in way of round windows.

6.2.2 Round window shall be disassembled and main frame shall be bolted as shown in Fig. 1. The aperture in ship side plating shall be as given in Table 1. The faying surface of round windows shall be coated liberally with zinc chromate primer before bolting in position.

Table 1 Aperture in Ship Plating

(*Clauses* 6.2.2 *and* 6.3.2)

Nominal Size	Aperture in Ship Plating	Pitch Circle Diameter for Fixing Holes for Bolted Round Windows
200	253	300
250	308	355
300	363	410
350	413	460
400	463	510
450	513	560

6.2.3 The round window shall then be assembled.

6.2.4 To avoid bi-metallic corrosion, neoprene washers and neoprene bushes shall be provided before fixing the bolts. As an alternative, stainless steel bolts and units may be used.

6.2.5 The ends of bolts shall be clenched after fixing.

6.3 Welded Round Windows

6.3.1 The steel bulkhead or shell in way of round window shall be made plane before fixing the round window in position.

6.3.2 The deadlight and glass holder shall be detached and the main frame shall be positioned properly. The aperture in ship side plated shall be as given in Table 1. It is recommended that the main frame should be tack welded in four positions in the sequence shown in Fig. 2 and then full welded neatly on both sides as shown in Fig. 3, maintaining the sequence as shown in Fig. 4 to avoid deformation in the frame due to welding.

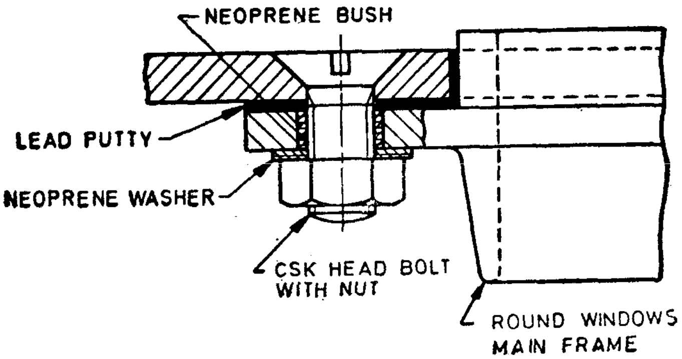


FIG. 1 METHOD OF FIXING BOLTED ROUND WINDOWS

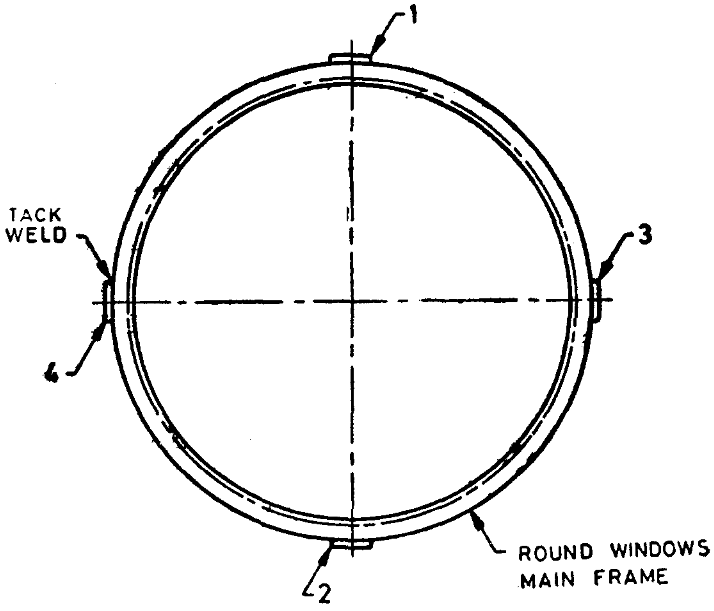


FIG. 2 SEQUENCE OF TACK WELDING

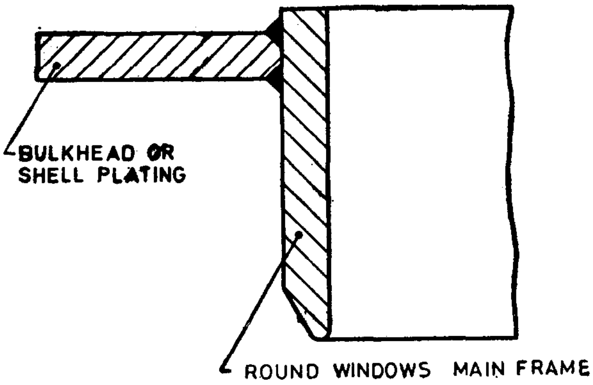


FIG. 3 METHOD OF FIXING WELDED ROUND WINDOWS

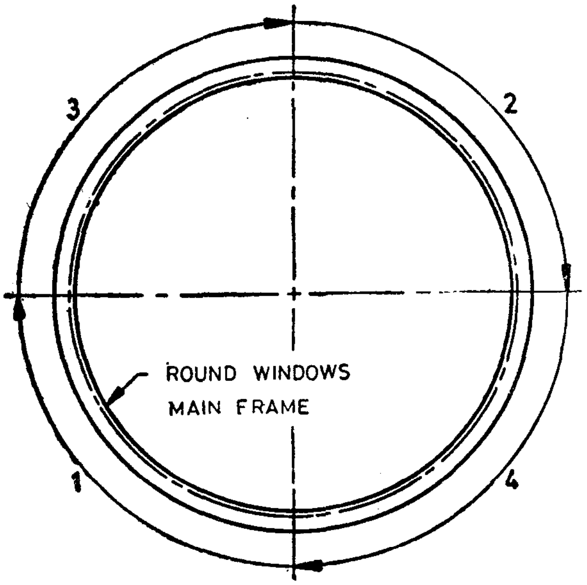


FIG. 4 SEQUENCE OF FULL WELDING

6.3.3 After welding the main frame to ship's structure, the glass holder and deadlight shall then be assembled.

6.3.4 Before welding main frame of non-opening type round windows, glass and closing ring shall be disassembled and replaced by an insert plate, screwed in, the dimensions of which are as given in Table 2 Use of the insert would avoid any deformation due to welding and also prevent the damage to glass and threads on the frame.

7 TESTING

7.1 During Manufacture

7.1.1 *Watertightness Tests*

This test shall be carried out in accordance with IS 5474 (Part 1) : 1989.

7.1.2 *Mechanical Strength Test*

This test shall be carried out in accordance with IS 5474 (Part 1): 1989.

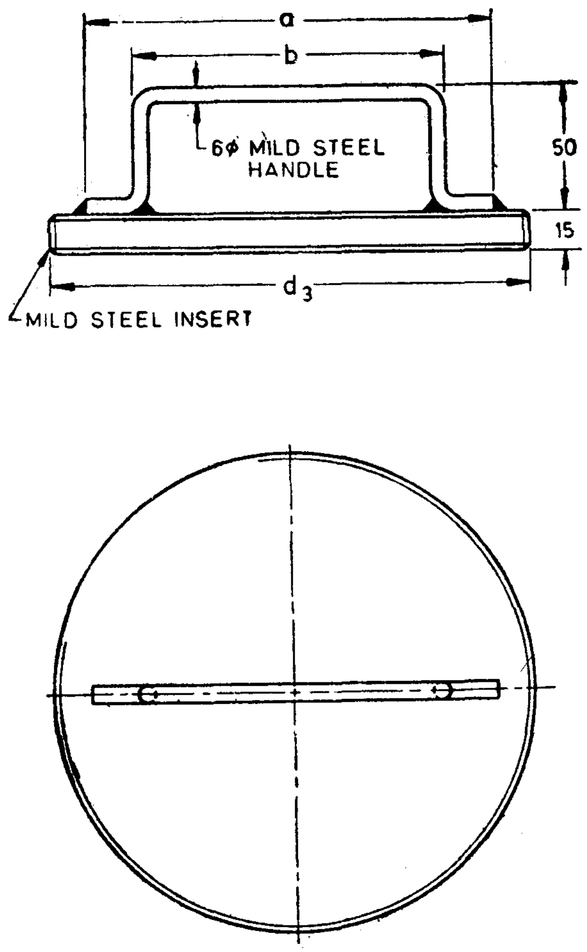
7.2 On Board Testing

The round window after fitting on boardship shall be hose-tested from outside such that the pressure indicated for hydraulic test for respective types of round windows are obtained at the point of impingement of the jet of water. Pump pressures and distance between nozzle and round window to be adjusted accordingly.

Table 2 Dimensions of Insert Plate

(*Clause* 6.3.4)

All dimensions in millimetres.



Nominal Size	*a*	*b*	d_3
200	160	120	M 235 × 2
250	220	140	M 285 × 2
300	220	140	M 335 × 2
350	220	140	M 385 × 2
400	220	140	M 435 × 2
450	220	140	M 485 × 2

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Amend No.	Date of Issue	Text Affected

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AMENDMENT NO. 1 APRIL 1995
TO
IS 5474 (Parts 1 to 5) : 1989 SHIPBUILDING — ROUND WINDOWS (SIDE SCUTTLES)

(First Revision)

(*Page* 1, *clause* **2**) — Substitute the following for the existing reference standards:

'IS No.	*Title*
1030 : 1989	Carbon steel castings for general engineering purposes (*fourth revision*)
2062 : 1992	Steel for general structural purposes (*fourth revision*)
8809 : 1991	Shipbuilding — Gaskets for ships side scuttles and rectangular windows (*first revision*)'

(*Page* 4, *clause* **8.2**) — Substitute 'IS 8809 : 1991' *for* 'IS 8809 : 1978'.

(*Page* 4, *clause* **9.1.5**, *informal table, last column*) — Substitute 'Without Glass and Closed Deadlight' *for* 'With Glass and Closed Deadlight'.

(*Page* 6, *Table* 1, *last column*) — Substitute 'IS 1030 : 1989 Grade 230-450 W' *for* '1030 : 1982 Grade 23-45' and 'IS 2062 : 1992' *for* 'IS 2062 : 1984'.

(TED 17)

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